EXHIBIT 1

FOURTH EDITION

Fundamentals of Heat and Mass Transfer

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Case 1 Constant Surface Temperature: $T(0, t) = T_s$

$$\frac{T(x, t) - T_s}{T_i - T_s} = \operatorname{erf}\left(\frac{x}{2\sqrt{\alpha t}}\right) \tag{5.57}$$

$$q_s''(t) = \frac{k(T_s - T_i)}{\sqrt{\pi \alpha t}} \tag{5.58}$$

Case 2 Constant Surface Heat Flux: $q_s'' = q_o''$

$$T(x, t) - T_i = \frac{2q_o''(\alpha t/\pi)^{1/2}}{k} \exp\left(\frac{-x^2}{4\alpha t}\right) - \frac{q_o'' x}{k} \operatorname{erfc}\left(\frac{x}{2\sqrt{\alpha t}}\right) \tag{5.59}$$

Case 3 Surface Convection: $-k \left.\frac{\partial T}{\partial x}\right|_{x=0} = h[T_\infty - T(0, t)]$

$$\frac{T(x, t) - T_i}{T_\infty - T_i} = \operatorname{erfc}\left(\frac{x}{2\sqrt{\alpha t}}\right) - \left[\exp\left(\frac{hx}{k} + \frac{h^2 \alpha t}{k^2}\right)\right]\left[\operatorname{erfc}\left(\frac{x}{2\sqrt{\alpha t}} + \frac{h\sqrt{\alpha t}}{k}\right)\right] \tag{5.60}$$

The *complementary error function*, erfc w, is defined as erfc $w \equiv 1 - \operatorname{erf} w$.

Temperature histories for the three cases are shown in Figure 5.7, and distinguishing features should be noted. With a step change in the surface temperature, case 1, temperatures within the medium monotonically approach T_s with increasing t, while the magnitude of the surface temperature gradient, and hence the surface heat flux, decreases as $t^{-1/2}$. In contrast, for a fixed surface heat flux (case 2), Equation 5.59 reveals that $T(0, t) = T_s(t)$ increases monotonically as $t^{1/2}$. For surface convection (case 3), the surface temperature and temperatures within the medium approach the fluid temperature T_∞ with increasing time. As T_s approaches T_∞, there is, of course, a reduction in the surface heat flux, $q_s''(t) = h[T_s(t) - T_\infty]$. Specific temperature histories computed from Equation 5.60 are plotted in Figure 5.8. The result corresponding to $h = \infty$ is equivalent to that associated with a sudden change in surface temperature, case 1.

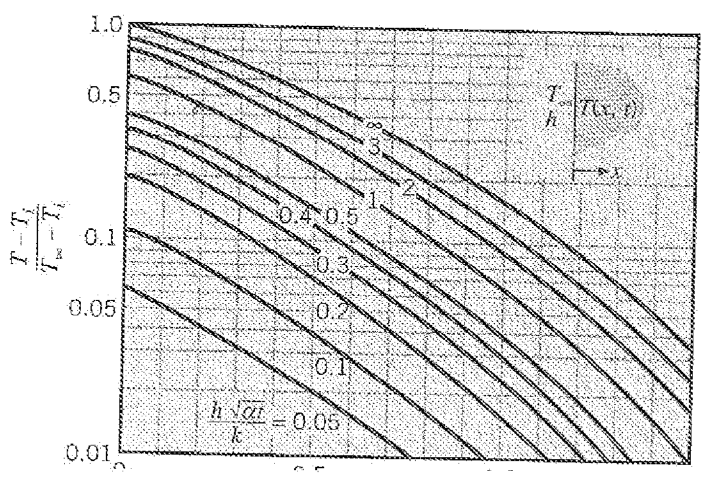

FIGURE 5.8 Temperature histories in a semi-infinite solid with sur-

EXHIBIT 2

MINIMIZING RESIDUAL STRESSES IN MOLDED PARTS

by

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Signature of Author Ming Jaw Liou
Department of Mechanical Engineering
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3.2.1 Thermal Properties of the Layer

In order to raise the interface temperature between the polymer flow and the cavity surface above the glass transition temperature for a few seconds after the filling process, the thermal properties of the layer should be selected as follows.

When two semi-infinite parts with different initial temperatures T_1 and T_2 come into contact, the temperature T_0 at the interface is governed by

$$\frac{T_1-T_0}{T_0-T_2}=\left(\frac{(k\rho c)_2}{(k\rho c)_1}\right)^{1/2}. \qquad (3.1)$$

where

$k =$ *thermal conductivity,*
$\rho =$ *density,*
$c =$ *specific heat.*

The interface temperature increases with decreasing $(k\rho c)$ of the insulation layer. T_0 is not a function of time for two semi-infinite parts. The derivation of equation (3.1) is shown in Appendix B.

In situations where the plastic part and the insulation layer have finite thicknesses, Equation (3.1) is still valid as long as the outside surface temperatures of the two parts are not affected by the contact. This fact will be used as the second criterion to estimate the required thickness of the layer. From equation (3.1), the value of $(k\rho c)$ for the insulation layer can be determined if T_0 is specified, since T_1, T_2 and $(k\rho c)$ of the polymer are known.

3.2.2 Thickness of the Layer

For equation (3.1) to be valid, the insulation layer should be thick enough so that the heat does not penetrate the layer within a specified time period. The

temperature history of a semi-infinite solid with step change in surface temperature from T_2 to T_o is given [12] by

$$\frac{T - T_2}{T_o - T_2} = erfc\left(\frac{z}{2\sqrt{\alpha t}}\right). \tag{3.2}$$

where
$erfc(u) = 1 - erf(u)$ *is the complementary error function,*
z = *distance from surface,*
$\alpha = \frac{k}{\rho c}$ = *thermal diffusivity,*
t = *time.*

By knowing the thermal properties of the layer from equation (3.1), the required thickness of the layer can be calculated if the time to keep the interface temperature well above T_g after filling for stress relaxation is specified.

3.3 Thermal Analyses

After calculating the required thermal properties and thickness of the layer based on the thermal criteria, it is necessary to check if the increase of cycle time is within the acceptable range.

It is expected that the subsequent cooling would take longer than when the insulation layer is excluded. However, the percent of increase should not be large for two reasons. First, since the thermal conductivity of polymer is much lower than those of the layer and the mold, the cooling time must be dominated by the heat conduction inside the polymer.

Second, a steep temperature gradient develops within the layer for the first few seconds while the surface temperature of the part is kept well above T_g. Although the thermal conductivity of the layer is lower than that of the mold, the

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EXHIBIT 3 (3 PTS.)

		Complementary Error Function Table													
x	erfc(x)	x	erfc(x)	x	erfc(x)	x	erfc(x)	x	erfc(x)	x	erfc(x)	x	erfc(x)
0	1.000000	0.5	0.479500	1	0.157299	1.5	0.033895	2	0.004678	2.5	0.000407	3	0.00002209
0.01	0.988717	0.51	0.470756	1.01	0.153190	1.51	0.032723	2.01	0.004475	2.51	0.000386	3.01	0.00002074
0.02	0.977435	0.52	0.462101	1.02	0.149162	1.52	0.031587	2.02	0.004281	2.52	0.000365	3.02	0.00001947
0.03	0.966159	0.53	0.453536	1.03	0.145216	1.53	0.030484	2.03	0.004094	2.53	0.000346	3.03	0.00001827
0.04	0.954889	0.54	0.445061	1.04	0.141350	1.54	0.029414	2.04	0.003914	2.54	0.000328	3.04	0.00001714
0.05	0.943628	0.55	0.436677	1.05	0.137564	1.55	0.028377	2.05	0.003742	2.55	0.000311	3.05	0.00001608
0.06	0.932378	0.56	0.428384	1.06	0.133856	1.56	0.027372	2.06	0.003577	2.56	0.000294	3.06	0.00001508
0.07	0.921142	0.57	0.420184	1.07	0.130227	1.57	0.026397	2.07	0.003418	2.57	0.000278	3.07	0.00001414
0.08	0.909922	0.58	0.412077	1.08	0.126674	1.58	0.025453	2.08	0.003266	2.58	0.000264	3.08	0.00001326
0.09	0.898719	0.59	0.404064	1.09	0.123197	1.59	0.024538	2.09	0.003120	2.59	0.000249	3.09	0.00001243
0.1	0.887537	0.6	0.396144	1.1	0.119795	1.6	0.023652	2.1	0.002979	2.6	0.000236	3.1	0.00001165
0.11	0.876377	0.61	0.388319	1.11	0.116467	1.61	0.022793	2.11	0.002845	2.61	0.000223	3.11	0.00001092
0.12	0.865242	0.62	0.380589	1.12	0.113212	1.62	0.021962	2.12	0.002716	2.62	0.000211	3.12	0.00001023
0.13	0.854133	0.63	0.372954	1.13	0.110029	1.63	0.021157	2.13	0.002593	2.63	0.000200	3.13	0.00000958
0.14	0.843053	0.64	0.365414	1.14	0.106918	1.64	0.020378	2.14	0.002475	2.64	0.000189	3.14	0.00000897
0.15	0.832004	0.65	0.357971	1.15	0.103876	1.65	0.019624	2.15	0.002361	2.65	0.000178	3.15	0.00000840
0.16	0.820988	0.66	0.350623	1.16	0.100904	1.66	0.018895	2.16	0.002253	2.66	0.000169	3.16	0.00000786
0.17	0.810008	0.67	0.343372	1.17	0.098000	1.67	0.018190	2.17	0.002149	2.67	0.000159	3.17	0.00000736
0.18	0.799064	0.68	0.336218	1.18	0.095163	1.68	0.017507	2.18	0.002049	2.68	0.000151	3.18	0.00000689
0.19	0.788160	0.69	0.329160	1.19	0.092392	1.69	0.016847	2.19	0.001954	2.69	0.000142	3.19	0.00000644
0.2	0.777297	0.7	0.322199	1.2	0.089686	1.7	0.016210	2.2	0.001863	2.7	0.000134	3.2	0.00000603
0.21	0.766478	0.71	0.315335	1.21	0.087045	1.71	0.015593	2.21	0.001776	2.71	0.000127	3.21	0.00000564
0.22	0.755704	0.72	0.308567	1.22	0.084466	1.72	0.014997	2.22	0.001692	2.72	0.000120	3.22	0.00000527
0.23	0.744977	0.73	0.301896	1.23	0.081950	1.73	0.014422	2.23	0.001612	2.73	0.000113	3.23	0.00000493
0.24	0.734300	0.74	0.295322	1.24	0.079495	1.74	0.013865	2.24	0.001536	2.74	0.000107	3.24	0.00000460
0.25	0.723674	0.75	0.288845	1.25	0.077100	1.75	0.013328	2.25	0.001463	2.75	0.000101	3.25	0.00000430
0.26	0.713100	0.76	0.282463	1.26	0.074764	1.76	0.012810	2.26	0.001393	2.76	0.000095	3.26	0.00000402
0.27	0.702582	0.77	0.276179	1.27	0.072486	1.77	0.012309	2.27	0.001326	2.77	0.000090	3.27	0.00000376
0.28	0.692120	0.78	0.269990	1.28	0.070266	1.78	0.011826	2.28	0.001262	2.78	0.000084	3.28	0.00000351
0.29	0.681717	0.79	0.263897	1.29	0.068101	1.79	0.011359	2.29	0.001201	2.79	0.000080	3.29	0.00000328
0.3	0.671373	0.8	0.257899	1.3	0.065992	1.8	0.010909	2.3	0.001143	2.8	0.000075	3.3	0.00000306
0.31	0.661092	0.81	0.251997	1.31	0.063937	1.81	0.010475	2.31	0.001088	2.81	0.000071	3.31	0.00000285
0.32	0.650874	0.82	0.246189	1.32	0.061935	1.82	0.010057	2.32	0.001034	2.82	0.000067	3.32	0.00000266
0.33	0.640721	0.83	0.240476	1.33	0.059985	1.83	0.009653	2.33	0.000984	2.83	0.000063	3.33	0.00000249
0.34	0.630635	0.84	0.234857	1.34	0.058086	1.84	0.009264	2.34	0.000935	2.84	0.000059	3.34	0.00000232
0.35	0.620618	0.85	0.229332	1.35	0.056238	1.85	0.008889	2.35	0.000889	2.85	0.000056	3.35	0.00000216
0.36	0.610670	0.86	0.223900	1.36	0.054439	1.86	0.008528	2.36	0.000845	2.86	0.000052	3.36	0.00000202
0.37	0.600794	0.87	0.218560	1.37	0.052688	1.87	0.008179	2.37	0.000803	2.87	0.000049	3.37	0.00000188
0.38	0.590991	0.88	0.213313	1.38	0.050984	1.88	0.007844	2.38	0.000763	2.88	0.000046	3.38	0.00000175
0.39	0.581261	0.89	0.208157	1.39	0.049327	1.89	0.007521	2.39	0.000725	2.89	0.000044	3.39	0.00000163
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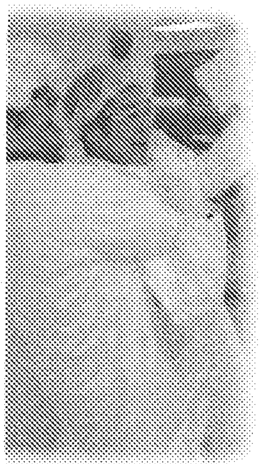
0.42	0.552532	0.92	0.193232	1.42	0.044624	1.92	0.006622	2.42	0.000621	2.92	0.000036	3.42	0.00000132
0.43	0.543113	0.93	0.188437	1.43	0.043143	1.93	0.006344	2.43	0.000589	2.93	0.000034	3.43	0.00000123
0.44	0.533775	0.94	0.183729	1.44	0.041703	1.94	0.006077	2.44	0.000559	2.94	0.000032	3.44	0.00000115
0.45	0.524518	0.95	0.179109	1.45	0.040305	1.95	0.005821	2.45	0.000531	2.95	0.000030	3.45	0.00000107
0.46	0.515345	0.96	0.174576	1.46	0.038946	1.96	0.005574	2.46	0.000503	2.96	0.000028	3.46	0.00000099
0.47	0.506255	0.97	0.170130	1.47	0.037627	1.97	0.005336	2.47	0.000477	2.97	0.000027	3.47	0.00000092
0.48	0.497250	0.98	0.165769	1.48	0.036346	1.98	0.005108	2.48	0.000453	2.98	0.000025	3.48	0.00000086
0.49	0.488332	0.99	0.161492	1.49	0.035102	1.99	0.004889	2.49	0.000429	2.99	0.000024	3.49	0.00000080



GT13 · erfc Table

x	erfc x	x	erfc x	x	erfc x	x	erfc x	x	erfc x	x	erfc x
0.01	9.89E-01	0.77	2.76E-01	1.53	3.05E-02	2.29	1.20E-03	3.05	1.51E-05	3.81	7.13E-08
0.02	9.77E-01	0.78	2.70E-01	1.54	2.94E-02	2.30	1.14E-03	3.06	1.52E-05	3.82	6.59E-08
0.03	9.66E-01	0.79	2.64E-01	1.55	2.84E-02	2.31	1.09E-03	3.07	1.42E-05	3.83	6.09E-08
0.04	9.55E-01	0.80	2.58E-01	1.56	2.74E-02	2.32	1.03E-03	3.08	1.33E-05	3.84	5.63E-08
0.05	9.44E-01	0.81	2.52E-01	1.57	2.64E-02	2.33	9.84E-04	3.09	1.24E-05	3.85	5.20E-08
0.06	9.32E-01	0.82	2.46E-01	1.58	2.55E-02	2.34	9.36E-04	3.10	1.17E-05	3.86	4.80E-08
0.07	9.21E-01	0.83	2.40E-01	1.59	2.45E-02	2.35	8.89E-04	3.11	1.09E-05	3.87	4.44E-08
0.08	9.10E-01	0.84	2.35E-01	1.60	2.37E-02	2.36	8.45E-04	3.12	1.02E-05	3.88	4.09E-08
0.09	8.99E-01	0.85	2.29E-01	1.61	2.28E-02	2.37	8.03E-04	3.13	9.59E-06	3.89	3.78E-08
0.10	8.88E-01	0.86	2.24E-01	1.62	2.20E-02	2.38	7.63E-04	3.14	8.98E-06	3.90	3.49E-08
0.11	8.76E-01	0.87	2.19E-01	1.63	2.12E-02	2.39	7.25E-04	3.15	8.41E-06	3.91	3.22E-08
0.12	8.65E-01	0.88	2.13E-01	1.64	2.04E-02	2.40	6.89E-04	3.16	7.87E-06	3.92	2.97E-08
0.13	8.54E-01	0.89	2.08E-01	1.65	1.96E-02	2.41	6.54E-04	3.17	7.36E-06	3.93	2.74E-08
0.14	8.43E-01	0.90	2.03E-01	1.66	1.89E-02	2.42	6.21E-04	3.18	6.89E-06	3.94	2.52E-08
0.15	8.32E-01	0.91	1.98E-01	1.67	1.82E-02	2.43	5.89E-04	3.19	6.45E-06	3.95	2.33E-08
0.16	8.21E-01	0.92	1.93E-01	1.68	1.75E-02	2.44	5.59E-04	3.20	6.03E-06	3.96	2.15E-08
0.17	8.10E-01	0.93	1.88E-01	1.69	1.68E-02	2.45	5.31E-04	3.21	5.64E-06	3.97	1.98E-08
0.18	7.99E-01	0.94	1.84E-01	1.70	1.62E-02	2.46	5.03E-04	3.22	5.27E-06	3.98	1.82E-08
0.19	7.88E-01	0.95	1.79E-01	1.71	1.56E-02	2.47	4.78E-04	3.23	4.93E-06	3.99	1.68E-08
0.20	7.77E-01	0.96	1.75E-01	1.72	1.50E-02	2.48	4.53E-04	3.24	4.61E-06	4.00	1.55E-08
0.21	7.66E-01	0.97	1.70E-01	1.73	1.44E-02	2.49	4.29E-04	3.25	4.31E-06	4.01	1.42E-08
0.22	7.56E-01	0.98	1.66E-01	1.74	1.39E-02	2.50	4.07E-04	3.26	4.02E-06	4.02	1.31E-08
0.23	7.45E-01	0.99	1.61E-01	1.75	1.33E-02	2.51	3.86E-04	3.27	3.76E-06	4.03	1.21E-08
0.24	7.34E-01	1.00	1.57E-01	1.76	1.28E-02	2.52	3.66E-04	3.28	3.51E-06	4.04	1.11E-08
0.25	7.24E-01	1.01	1.53E-01	1.77	1.23E-02	2.53	3.46E-04	3.29	3.28E-06	4.05	1.02E-08
0.26	7.13E-01	1.02	1.49E-01	1.78	1.18E-02	2.54	3.28E-04	3.30	3.06E-06	4.06	9.40E-09
0.27	7.03E-01	1.03	1.45E-01	1.79	1.14E-02	2.55	3.11E-04	3.31	2.86E-06	4.07	8.65E-09
0.28	6.92E-01	1.04	1.41E-01	1.80	1.09E-02	2.56	2.94E-04	3.32	2.67E-06	4.08	7.95E-09
0.29	6.82E-01	1.05	1.38E-01	1.81	1.05E-02	2.57	2.79E-04	3.33	2.49E-06	4.09	7.31E-09
0.30	6.71E-01	1.06	1.34E-01	1.82	1.01E-02	2.58	2.64E-04	3.34	2.32E-06	4.10	6.72E-09
0.31	6.61E-01	1.07	1.30E-01	1.83	9.65E-03	2.59	2.50E-04	3.35	2.17E-06	4.11	6.18E-09
0.32	6.51E-01	1.08	1.27E-01	1.84	9.26E-03	2.60	2.36E-04	3.36	2.02E-06	4.12	5.68E-09
0.33	6.41E-01	1.09	1.23E-01	1.85	8.89E-03	2.61	2.23E-04	3.37	1.88E-06	4.13	5.21E-09
0.34	6.31E-01	1.10	1.20E-01	1.86	8.56E-03	2.62	2.11E-04	3.38	1.75E-06	4.14	4.79E-09
0.35	6.21E-01	1.11	1.16E-01	1.87	8.18E-03	2.63	2.00E-04	3.39	1.64E-06	4.15	4.40E-09
0.36	6.11E-01	1.12	1.13E-01	1.88	7.84E-03	2.64	1.89E-04	3.40	1.52E-06	4.16	4.04E-09
0.37	6.01E-01	1.13	1.10E-01	1.89	7.52E-03	2.65	1.79E-04	3.41	1.42E-06	4.17	3.71E-09
0.38	5.91E-01	1.14	1.07E-01	1.90	7.21E-03	2.66	1.69E-04	3.42	1.32E-06	4.18	3.40E-09
0.39	5.81E-01	1.15	1.04E-01	1.91	6.91E-03	2.67	1.59E-04	3.43	1.23E-06	4.19	3.12E-09
0.40	5.72E-01	1.16	1.01E-01	1.92	6.62E-03	2.68	1.51E-04	3.44	1.15E-06	4.20	2.87E-09
0.41	5.62E-01	1.17	9.80E-02	1.93	6.34E-03	2.69	1.42E-04	3.45	1.07E-06	4.21	2.63E-09
0.42	5.53E-01	1.18	9.50E-02	1.94	6.08E-03	2.70	1.34E-04	3.46	9.94E-07	4.22	2.41E-09
0.43	5.43E-01	1.19	9.24E-02	1.95	5.82E-03	2.71	1.27E-04	3.47	9.25E-07	4.23	2.21E-09
0.44	5.34E-01	1.20	8.97E-02	1.96	5.57E-03	2.72	1.20E-04	3.48	8.60E-07	4.24	2.03E-09
0.45	5.25E-01	1.21	8.70E-02	1.97	5.34E-03	2.73	1.13E-04	3.49	8.00E-07	4.25	1.86E-09
0.46	5.15E-01	1.22	8.45E-02	1.98	5.11E-03	2.74	1.07E-04	3.50	7.44E-07	4.26	1.70E-09
0.47	5.06E-01	1.23	8.19E-02	1.99	4.89E-03	2.75	1.01E-04	3.51	6.92E-07	4.27	1.56E-09
0.48	4.97E-01	1.24	7.95E-02	2.00	4.68E-03	2.76	9.50E-05	3.52	6.43E-07	4.28	1.43E-09
0.49	4.88E-01	1.25	7.71E-02	2.01	4.48E-03	2.77	8.96E-05	3.53	5.98E-07	4.29	1.31E-09
0.50	4.79E-01	1.26	7.48E-02	2.02	4.28E-03	2.78	8.44E-05	3.54	5.56E-07	4.30	1.20E-09
0.51	4.71E-01	1.27	7.25E-02	2.03	4.09E-03	2.79	7.95E-05	3.55	5.16E-07	4.31	1.10E-09
0.52	4.62E-01	1.28	7.03E-02	2.04	3.91E-03	2.80	7.50E-05	3.56	4.80E-07	4.32	1.00E-09
0.53	4.54E-01	1.29	6.81E-02	2.05	3.74E-03	2.81	7.07E-05	3.57	4.46E-07	4.33	9.19E-10
0.54	4.45E-01	1.30	6.60E-02	2.06	3.58E-03	2.82	6.66E-05	3.58	4.14E-07	4.34	8.41E-10
0.55	4.37E-01	1.31	6.39E-02	2.07	3.42E-03	2.83	6.28E-05	3.59	3.84E-07	4.35	7.69E-10
0.56	4.28E-01	1.32	6.19E-02	2.08	3.27E-03	2.84	5.91E-05	3.60	3.56E-07	4.36	7.03E-10
0.57	4.20E-01	1.33	6.00E-02	2.09	3.12E-03	2.85	5.57E-05	3.61	3.31E-07	4.37	6.43E-10
0.58	4.12E-01	1.34	5.81E-02	2.10	2.98E-03	2.86	5.24E-05	3.62	3.07E-07	4.38	5.88E-10
0.59	4.04E-01	1.35	5.62E-02	2.11	2.85E-03	2.87	4.94E-05	3.63	2.85E-07	4.39	5.37E-10
0.60	3.96E-01	1.36	5.44E-02	2.12	2.72E-03	2.88	4.64E-05	3.64	2.64E-07	4.40	4.91E-10
0.61	3.88E-01	1.37	5.27E-02	2.13	2.59E-03	2.89	4.37E-05	3.65	2.45E-07	4.41	4.49E-10
0.62	3.81E-01	1.38	5.10E-02	2.14	2.47E-03	2.90	4.11E-05	3.66	2.27E-07	4.42	4.10E-10
0.63	3.73E-01	1.39	4.92E-02	2.15	2.36E-03	2.91	3.87E-05	3.67	2.11E-07	4.43	3.74E-10
0.64	3.65E-01	1.40	4.77E-02	2.16	2.25E-03	2.92	3.64E-05	3.68	1.95E-07	4.44	3.43E-10
0.65	3.58E-01	1.41	4.61E-02	2.17	2.15E-03	2.93	3.42E-05	3.69	1.81E-07	4.45	3.12E-10
0.66	3.51E-01	1.42	4.46E-02	2.18	2.05E-03	2.94	3.22E-05	3.70	1.67E-07	4.46	2.85E-10
0.67	3.43E-01	1.43	4.31E-02	2.19	1.95E-03	2.95	3.02E-05	3.71	1.55E-07	4.47	2.60E-10
0.68	3.36E-01	1.44	4.17E-02	2.20	1.86E-03	2.96	2.84E-05	3.72	1.44E-07	4.48	2.37E-10
0.69	3.29E-01	1.45	4.03E-02	2.21	1.78E-03	2.97	2.67E-05	3.73	1.22E-07	4.49	2.17E-10
0.70	3.22E-01	1.46	3.89E-02	2.22	1.69E-03	2.98	2.51E-05	3.74	1.23E-07	4.50	1.98E-10
0.71	3.15E-01	1.47	3.76E-02	2.23	1.61E-03	2.99	2.35E-05	3.75	1.14E-07		
0.72	3.02E-01	1.48	3.63E-02	2.24	1.54E-03	3.00	2.21E-05	3.76	1.05E-07		
0.73	3.01E-01	1.49	3.51E-02	2.25	1.46E-03	3.01	2.08E-05	3.77	9.76E-08		
0.74	2.95E-01	1.50	3.39E-02	2.26	1.39E-03	3.02	1.95E-05	3.78	9.03E-08		
0.75	2.89E-01	1.51	3.27E-02	2.27	1.33E-03	3.03	1.83E-05	3.79	8.35E-08		

Graphs and Tables

0.76	2.82E-01	1.52	3.16E-02	2.28	1.26E-03	3.04	1.72E-05	3.80	7.72E-08

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erfc Table

x	erfc x	x	erfc x	x	erfc x	x	erfc x	x	erfc x	x	erfc x
0.01	9.89E-01	0.77	2.76E-01	1.53	3.05E-02	2.29	1.20E-03	3.05	1.61E-05	3.81	7.13E-08
0.02	9.77E-01	0.78	2.70E-01	1.54	2.94E-02	2.30	1.14E-03	3.06	1.52E-05	3.82	6.59E-08
0.03	9.66E-01	0.79	2.64E-01	1.55	2.84E-02	2.31	1.09E-03	3.07	1.42E-05	3.83	6.09E-08
0.04	9.55E-01	0.80	2.58E-01	1.56	2.74E-02	2.32	1.03E-03	3.08	1.33E-05	3.84	5.63E-08
0.05	9.44E-01	0.81	2.52E-01	1.57	2.64E-02	2.33	9.84E-04	3.09	1.24E-05	3.85	5.20E-08
0.06	9.32E-01	0.82	2.46E-01	1.58	2.55E-02	2.34	9.36E-04	3.10	1.17E-05	3.86	4.80E-08
0.07	9.21E-01	0.83	2.40E-01	1.59	2.45E-02	2.35	8.89E-04	3.11	1.09E-05	3.87	4.44E-08
0.08	9.10E-01	0.84	2.35E-01	1.60	2.37E-02	2.36	8.45E-04	3.12	1.02E-05	3.88	4.09E-08
0.09	8.99E-01	0.85	2.29E-01	1.61	2.28E-02	2.37	8.03E-04	3.13	9.59E-06	3.89	3.78E-08
0.10	8.88E-01	0.86	2.24E-01	1.62	2.20E-02	2.38	7.63E-04	3.14	8.98E-06	3.90	3.49E-08
0.11	8.76E-01	0.87	2.19E-01	1.63	2.12E-02	2.39	7.25E-04	3.15	8.41E-06	3.91	3.22E-08
0.12	8.56E-01	0.88	2.13E-01	1.64	2.04E-02	2.40	6.89E-04	3.16	7.87E-06	3.92	2.97E-08
0.13	8.54E-01	0.89	2.08E-01	1.65	1.96E-02	2.41	6.54E-04	3.17	7.36E-06	3.93	2.74E-08
0.14	8.43E-01	0.90	2.03E-01	1.66	1.89E-02	2.42	6.21E-04	3.18	6.89E-06	3.94	2.52E-08
0.15	8.32E-01	0.91	1.98E-01	1.67	1.82E-02	2.43	5.89E-04	3.19	6.45E-06	3.95	2.33E-08
0.16	8.21E-01	0.92	1.93E-01	1.68	1.75E-02	2.44	5.59E-04	3.20	6.03E-06	3.96	2.15E-08
0.17	8.10E-01	0.93	1.88E-01	1.69	1.68E-02	2.45	5.31E-04	3.21	5.64E-06	3.97	1.98E-08
0.18	7.99E-01	0.94	1.84E-01	1.70	1.62E-02	2.46	5.03E-04	3.22	5.27E-06	3.98	1.82E-08
0.19	7.88E-01	0.95	1.79E-01	1.71	1.56E-02	2.47	4.78E-04	3.23	4.93E-06	3.99	1.68E-08
0.20	7.77E-01	0.96	1.75E-01	1.72	1.50E-02	2.48	4.53E-04	3.24	4.61E-06	4.00	1.55E-08
0.21	7.66E-01	0.97	1.70E-01	1.73	1.44E-02	2.49	4.29E-04	3.25	4.31E-06	4.01	1.42E-08
0.22	7.56E-01	0.98	1.66E-01	1.74	1.39E-02	2.50	4.07E-04	3.26	4.02E-06	4.02	1.31E-08
0.23	7.45E-01	0.99	1.61E-01	1.75	1.33E-02	2.51	3.86E-04	3.27	3.76E-06	4.03	1.21E-08
0.24	7.34E-01	1.00	1.57E-01	1.76	1.28E-02	2.52	3.66E-04	3.28	3.51E-06	4.04	1.11E-08
0.25	7.24E-01	1.01	1.53E-01	1.77	1.23E-02	2.53	3.46E-04	3.29	3.28E-06	4.05	1.02E-08
0.26	7.13E-01	1.02	1.49E-01	1.78	1.18E-02	2.54	3.28E-04	3.30	3.06E-06	4.06	9.40E-09
0.27	7.03E-01	1.03	1.45E-01	1.79	1.14E-02	2.55	3.11E-04	3.31	2.86E-06	4.07	8.65E-09
0.28	6.92E-01	1.04	1.41E-01	1.80	1.09E-02	2.56	2.94E-04	3.32	2.67E-06	4.08	7.95E-09
0.29	6.82E-01	1.05	1.38E-01	1.81	1.05E-02	2.57	2.79E-04	3.33	2.49E-06	4.09	7.31E-09
0.30	6.71E-01	1.06	1.34E-01	1.82	1.01E-02	2.58	2.64E-04	3.34	2.32E-06	4.10	6.72E-09
0.31	6.61E-01	1.07	1.30E-01	1.83	9.65E-03	2.59	2.50E-04	3.35	2.17E-06	4.11	6.18E-09
0.32	6.51E-01	1.08	1.27E-01	1.84	9.26E-03	2.60	2.36E-04	3.36	2.02E-06	4.12	5.68E-09
0.33	6.41E-01	1.09	1.23E-01	1.85	8.89E-03	2.61	2.23E-04	3.37	1.88E-06	4.13	5.21E-09
0.34	6.31E-01	1.10	1.20E-01	1.86	8.56E-03	2.62	2.11E-04	3.38	1.75E-06	4.14	4.79E-09
0.35	6.21E-01	1.11	1.16E-01	1.87	8.18E-03	2.63	2.00E-04	3.39	1.64E-06	4.15	4.40E-09
0.36	6.11E-01	1.12	1.13E-01	1.88	7.84E-03	2.64	1.89E-04	3.40	1.52E-06	4.16	4.04E-09
0.37	6.01E-01	1.13	1.10E-01	1.89	7.52E-03	2.65	1.79E-04	3.41	1.42E-06	4.17	3.71E-09
0.38	5.91E-01	1.14	1.07E-01	1.90	7.21E-03	2.66	1.69E-04	3.42	1.32E-06	4.18	3.40E-09
0.39	5.81E-01	1.15	1.04E-01	1.91	6.91E-03	2.67	1.59E-04	3.43	1.23E-06	4.19	3.12E-09
0.40	5.72E-01	1.16	1.01E-01	1.92	6.62E-03	2.68	1.51E-04	3.44	1.15E-06	4.20	2.87E-09
0.41	5.62E-01	1.17	9.80E-02	1.93	6.34E-03	2.69	1.42E-04	3.45	1.07E-06	4.21	2.63E-09
0.42	5.53E-01	1.18	9.50E-02	1.94	6.08E-03	2.70	1.34E-04	3.46	9.94E-07	4.22	2.41E-09
0.43	5.43E-01	1.19	9.24E-02	1.95	5.82E-03	2.71	1.27E-04	3.47	9.25E-07	4.23	2.21E-09
0.44	5.34E-01	1.20	8.97E-02	1.96	5.57E-03	2.72	1.20E-04	3.48	8.60E-07	4.24	2.03E-09
0.45	5.25E-01	1.21	8.70E-02	1.97	5.34E-03	2.73	1.13E-04	3.49	8.00E-07	4.25	1.86E-09
0.46	5.15E-01	1.22	8.45E-02	1.98	5.11E-03	2.74	1.07E-04	3.50	7.44E-07	4.26	1.70E-09
0.47	5.06E-01	1.23	8.19E-02	1.99	4.89E-03	2.75	1.01E-04	3.51	6.92E-07	4.27	1.56E-09
0.48	4.97E-01	1.24	7.95E-02	2.00	4.88E-03	2.76	9.50E-05	3.52	6.43E-07	4.28	1.43E-09
0.49	4.88E-01	1.25	7.71E-02	2.01	4.48E-03	2.77	8.96E-05	3.53	5.98E-07	4.29	1.31E-09
0.50	4.79E-01	1.26	7.48E-02	2.02	4.28E-03	2.78	8.44E-05	3.54	5.56E-07	4.30	1.20E-09
0.51	4.71E-01	1.27	7.25E-02	2.03	4.09E-03	2.79	7.96E-05	3.55	5.16E-07	4.31	1.10E-09
0.52	4.62E-01	1.28	7.03E-02	2.04	3.91E-03	2.80	7.50E-05	3.56	4.80E-07	4.32	1.00E-09
0.53	4.54E-01	1.29	6.81E-02	2.05	3.74E-03	2.81	7.07E-05	3.57	4.45E-07	4.33	9.19E-10
0.54	4.45E-01	1.30	6.60E-02	2.06	3.58E-03	2.82	6.66E-05	3.58	4.14E-07	4.34	8.41E-10
0.55	4.37E-01	1.31	6.39E-02	2.07	3.42E-03	2.83	6.28E-05	3.59	3.84E-07	4.35	7.69E-10
0.56	4.28E-01	1.32	6.19E-02	2.08	3.27E-03	2.84	5.91E-05	3.60	3.56E-07	4.36	7.03E-10
0.57	4.20E-01	1.33	6.00E-02	2.09	3.12E-03	2.85	5.57E-05	3.61	3.31E-07	4.37	6.43E-10
0.58	4.12E-01	1.34	5.81E-02	2.10	2.98E-03	2.86	5.24E-05	3.62	3.07E-07	4.38	5.88E-10
0.59	4.04E-01	1.35	5.62E-02	2.11	2.85E-03	2.87	4.94E-05	3.63	2.85E-07	4.39	5.37E-10
0.60	3.96E-01	1.36	5.44E-02	2.12	2.72E-03	2.88	4.64E-05	3.64	2.64E-07	4.40	4.91E-10
0.61	3.88E-01	1.37	5.27E-02	2.13	2.59E-03	2.89	4.37E-05	3.65	2.45E-07	4.41	4.49E-10
0.62	3.81E-01	1.38	5.10E-02	2.14	2.47E-03	2.90	4.11E-05	3.66	2.27E-07	4.42	4.10E-10
0.63	3.73E-01	1.39	4.92E-02	2.15	2.36E-03	2.91	3.87E-05	3.67	2.11E-07	4.43	3.74E-10
0.64	3.65E-01	1.40	4.77E-02	2.16	2.25E-03	2.92	3.64E-05	3.68	1.95E-07	4.44	3.43E-10
0.65	3.58E-01	1.41	4.61E-02	2.17	2.15E-03	2.93	3.42E-05	3.69	1.81E-07	4.45	3.12E-10

0.66	3.51E-01	1.42	4.46E-02	2.18	2.05E-03	2.94	3.22E-05	3.70	1.67E-07	4.46	2.85E-10
0.67	3.43E-01	1.43	4.31E-02	2.19	1.95E-03	2.95	3.02E-05	3.71	1.55E-07	4.47	2.60E-10
0.68	3.36E-01	1.44	4.17E-02	2.20	1.86E-03	2.96	2.84E-05	3.72	1.44E-07	4.48	2.37E-10
0.69	3.29E-01	1.45	4.03E-02	2.21	1.78E-03	2.97	2.67E-05	3.73	1.22E-07	4.49	2.17E-10
0.70	3.22E-01	1.46	3.89E-02	2.22	1.69E-03	2.98	2.51E-05	3.74	1.23E-07	4.50	1.98E-10
0.71	3.15E-01	1.47	3.76E-02	2.23	1.61E-03	2.99	2.35E-05	3.75	1.14E-07		
0.72	3.02E-01	1.48	3.63E-02	2.24	1.54E-03	3.00	2.21E-05	3.76	1.05E-07		
0.73	3.01E-01	1.49	3.51E-02	2.25	1.46E-03	3.01	2.08E-05	3.77	9.76E-08		
0.74	2.95E-01	1.50	3.39E-02	2.26	1.39E-03	3.02	1.95E-05	3.78	9.03E-08		
0.75	2.89E-01	1.51	3.27E-02	2.27	1.33E-03	3.03	1.83E-05	3.79	8.35E-08		
0.76	2.82E-01	1.52	3.16E-02	2.28	1.26E-03	3.04	1.72E-05	3.80	7.72E-08		